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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/009,704	10/29/2001	Dwight Sherod Walker	PU3682USW	4332

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EXAMINER

GAKH, YELENA G

ART UNIT PAPER NUMBER

1743

DATE MAILED: 10/07/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/009,704

Applicant(s)

WALKER ET AL

Examiner

Yelena G. Gakh, Ph.D.

Art Unit

1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 26-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-25, drawn to a method for identifying impurities in a cryogenic liquid.

Group II, claim(s) 26-29, drawn to a system for sampling a plurality of cryogenic liquid samples.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the technical features common for both inventions are a flow cell for holding cryogenic sample with impurities and IR analyzer for measuring the presence and concentration of impurities, which are known technical features in the art, see e.g. Moulson et al. (Nuclear Instruments), and therefore are not the special technical features shared by the inventions.

2. During a telephone conversation with Robert Smith for Charles E. Dadswell on 09/26/03 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-25. Affirmation of this election must be made by applicant in replying to this Office action. Claims 26-29 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. The specification is objected to as not written in such clear and exact terms as to enable any routineer in the art to practice the invention in its best mode. The specification discloses measuring the absorption spectrum of the cryogenic liquid using IR spectroscopy and obtaining the reference cryogenic liquid absorption spectrum. It is not clear, what is meant by the expression that this spectrum has "a first reference energy" (page 2, line 25). The IR spectrum cannot have energy – it contains absorption signals at certain wavelengths, which correspond to certain energies. The same is true for the "second reference energy". It is even less clear, how these absorption energies can be divided one over another and what can be the result of such division (page 4, lines 10-15)? It is equivalent to dividing one wavelength over the other, which does not make much sense. In description of the system of the invention on the same page very clear and correct terms are used for describing the same subject matter, i.e. measuring "absorption intensities" in IR spectra of the reference cryogenic liquid, reference impurity and cryogenic sample having this impurity. It is not clear, why the same subject matter is described in such different unclear and confusing terms for the proposed method? Furthermore, it is not clear from the specification, how such "ratio of energies" defined by species coming from different sources, i.e. a pure cryogenic liquid and "pure" impurity target – can identify the concentration of the impurity in the real sample, when no parameters of its spectrum are present in the equation? The equation given for determination of impurity concentrations is absolutely unclear.

It is not a conventional practice in the art to define chemical compounds, i.e. contaminants or impurities, by their vibration energies in Hz (page 6). It does not give a clear and apparent description of the potential contaminants and is inappropriate for a disclosure, which, as it has already been stated should be written in the most clear and precise terms.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 8, 10-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. As it is indicated above, the specification does not adequately explain what the first and second reference energies of the absorption spectra of the cryogenic liquid and impurity are, and how it is possible to measure the concentration of the impurity in the sample by using the ratio of these two "reference energies" without any parameters from the sample spectrum involved in the equation?

Claims 8, 16 and 24 recite compounds defined by their vibration frequencies in Hz, which is not a conventional way for defining compounds and which does not have an adequate description in the specification; therefore these claims are not enabled by the specification.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

8. Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "a method for identifying impurities in a cryogenic liquid", however its steps comprise measuring the spectrum of at least one impurity and **confirming** the presence of **this** impurity in the sample. If it is already known that the specific impurity is present in the sample, then it is not clear, what does this method accomplish? And if the impurity is not known, which impurity should be measured as a reference?

The expression "3 x 10e14-12e14Hz" in claims 8, 16 and 24 is not clear. What is "3 x 10e14"? Is this 30e14? The values are not given in conventional units.

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Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. **Claims 1-5, 7 and 9** are rejected under 35 U.S.C. 102(b) as being anticipated by Moulson et al. (Nuclear Instruments).

Moulson teaches “monitoring of dopant and impurity concentrations in liquid argon by infrared spectroscopy” (Title) by measuring IR spectra of cryogenic argon (Figure 2), an impurity (volatile organic compound having CH bond, ethylene) alone (Figure 3a) and impurity in the cryogenic liquid (Figure 3b) in a spectrum range $400\text{-}4000\text{ cm}^{-1}$ (2500-250 nm) (Figures 1-3) in a flow cell with a pressure drop between 0.85-1.05 bar ($\sim\text{lb/in}^2$) (page 278, right column) and confirming the presence of the impurity by comparing the spectrum with the reference spectra of pure argon and ethylene.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Moulson.

While Moulson does not specifically teach fluorinated hydrocarbons as cryogenic liquids, it would have been obvious for anyone of ordinary skill in the art to apply his method to analyze purification of such compounds, because various applications of e.g. freons require their purification, and Moulson's method is obviously the most convenient for determining their purity.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. *Devyatykh et al. (Vysochistye Veshchestva)* disclose "vibrational spectra of liquid high-purity silicon, germanium, sulfur, and selenium hydrides and their solutions in liquid krypton"; *Zhigula et al. (Zhurnal Prikladnoi Spektroskopii)* disclose an "application of a cryospectroscopy method to study the molecular composition of gases"; *Kondaurov et al. (Vysokochistye Veshchestva)* disclose "vibrational spectra of phosphine of various degrees of purity in a solution of liquid argon"; *Nabiev et al. (Vysochistye Veshchestva)* teach "IR spectroscopy and analysis of the impurity composition of individual xenon fluorides in liquid noble gas solutions".

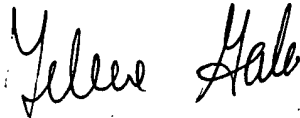
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (703) 306-5906. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (703) 308-4037. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Yelena G. Gakh
9/29/03

A handwritten signature in cursive script that reads "Yelena Gakh".